

In this security exercise, students will work in teams to disassemble and then reassemble a desktop computer. The exact computer components may vary from the pictures, as they do in real life, but the basic functions of the components is similar.



First, look up the term “ESD – Electrostatic Discharge” in Wikipedia and write a basic definition here:

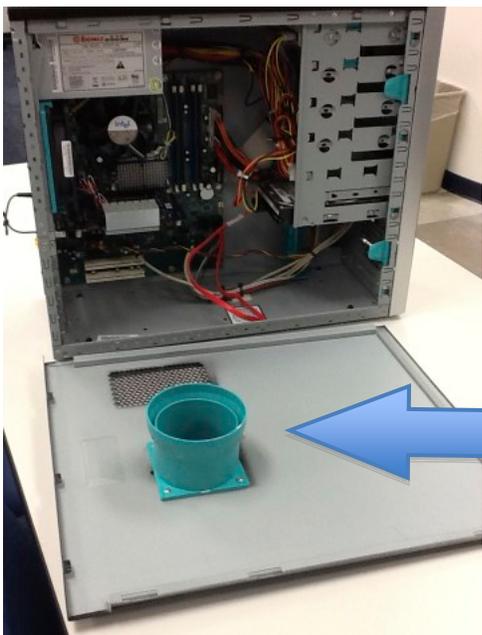
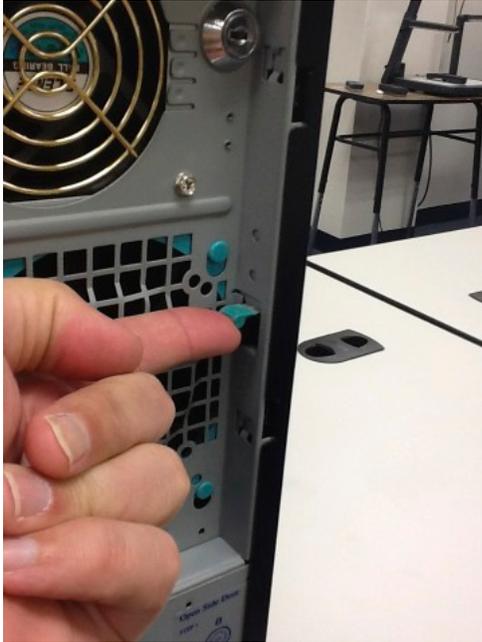
While static electricity may not seem to carry a lot of current, it can have a very high voltage, and this can easily damage electronic components. In the Fleet, Electronic Technicians are trained to use special techniques and handling to ensure expensive taxpayer equipment is not damaged. In this class, we will simply apply reasonable precautions. These include: 1) Not touching electrical components that you don't have to, 2) taking care not to build up static electricity on your person by shuffling over carpeting, etc. 3) Grounding yourself at regular intervals.

The chassis of a computer (and essentially every electrical device one can imagine), is always connected to earth ground. Why?

With the power cord plugged into the computer and to the wall socket, you can ground yourself simply by placing your hand on any metal part of the computer chassis (not painted). Because the chassis is connected to earth ground via the power cord, you and the computer now have zero potential difference (voltage). In the Fleet, ET's will always have a grounding strap to keep themselves grounded as they work. We won't bother with that in class, but everyone should ground themselves before beginning the exercise.

Now remove the power cord from the computer and the wall socket. For safety reasons, do not plug it back in until the computer is completely reassembled and the chassis has been closed.

1. Using the screwdriver, remove the two screws that secure the side panel of the computer chassis. Then lift the tab to release the panel, slide it aft, and then pivot it downward and away. Set it aside.

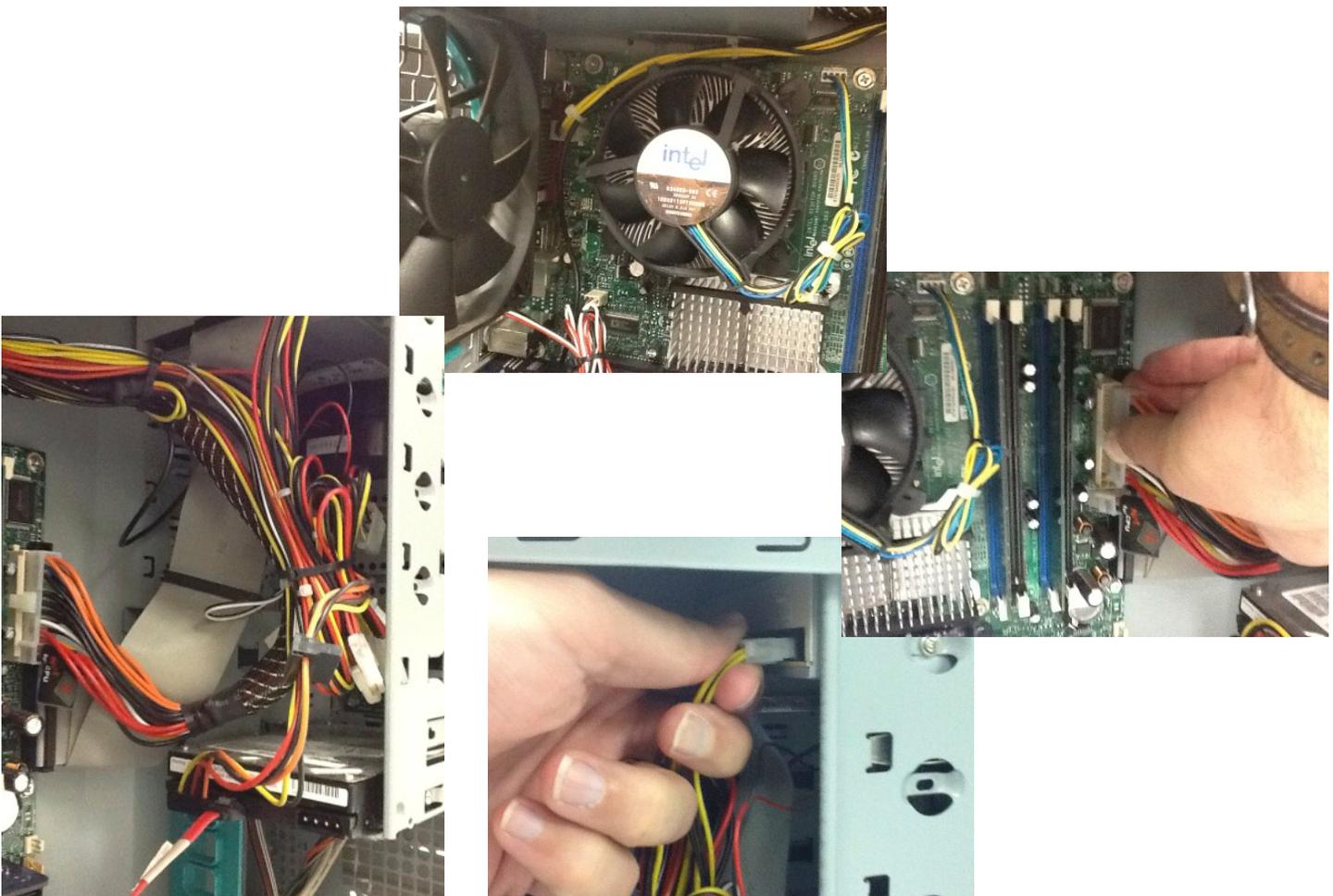


What do you think this is for?

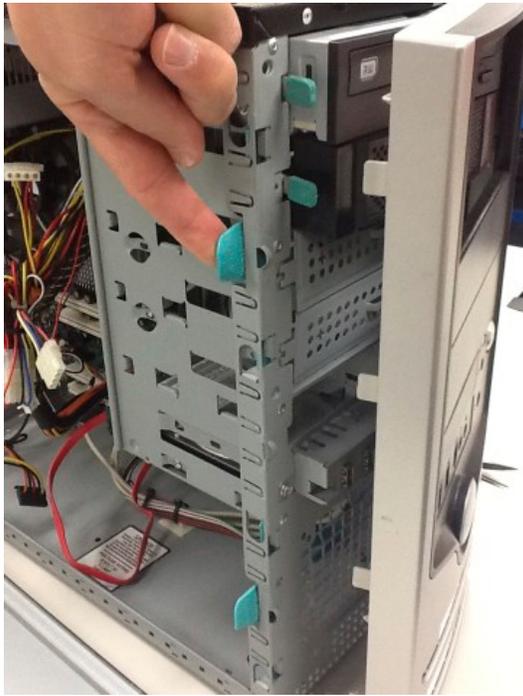
2. Let's first remove the power supply. Almost all the power supplied to the computer comes from this box. Write down its key engineering specifications here:



Now follow the cables coming from the power supply and disconnect them wherever they attach to components. Several examples are shown below:

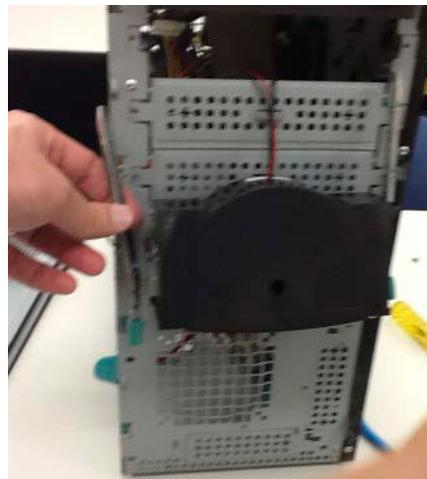


One of the devices needing power may be a powered speaker mounted in the front of the chassis. We'll need to be creative in removing it. First, remove the front panel by pulling the side tabs forward, then rotating the plastic front panel outward. Lay the panel aside.

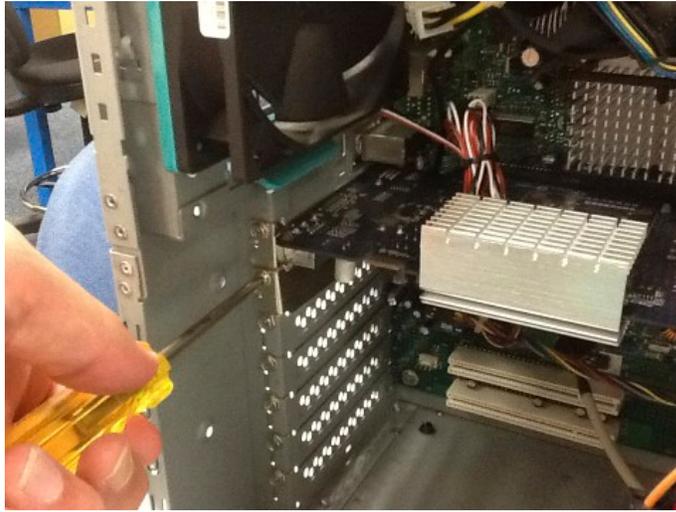


List some advantages and disadvantages of designing the enclosure of a computer to be more easily accessed.

You may need to remove screws in the side of the speaker unit. Then gently pull on the side tabs to remove the speaker. You will then need to remove the slide tabs and carefully feed the speaker back through the front opening.

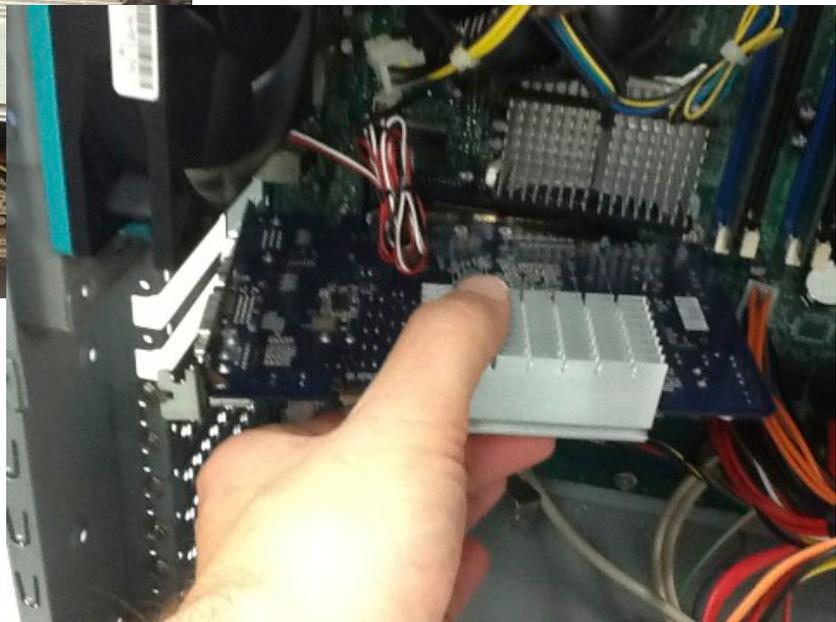


Finally, you will probably also need to remove an audio power supply mounted on the rear panel. Remove the screw holding the panel in place.



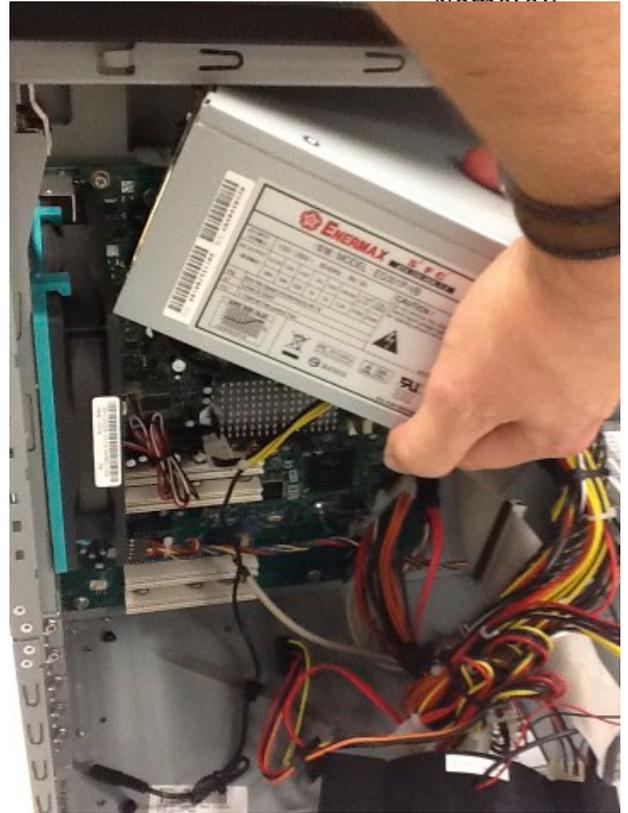
Few computers have this type of speaker power supply. What are the implications for speakers we might attach to this computer?

To better access the power supply, let's also remove the video card mounted above the audio panel. Remove the screw in a similar fashion, then carefully push the card from the outside and pivot it away from the motherboard. It should require firm steady pressure to disconnect. Handle it carefully and set it aside.



EE487: Applications of Cyber Engineering
SX-1: Computer Assembly

Now you should be able to remove the power supply itself after verifying that there are no other power cables attached inside the computer. Remove the four screws on the back panel that hold the power supply in place. Then push it into the case while ensuring that you hold it with your other hand. Carefully remove it and set it aside, along with all of the attached wiring.



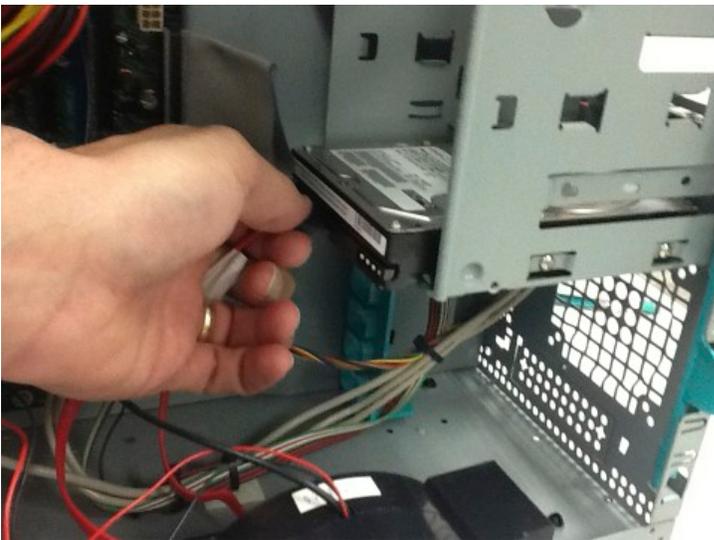
The video card we removed is interesting. What is the large metal device with fins attached to the card, and why is it necessary, do you think?

What purpose does the video card serve? Why do we need one? Does it have to be a separate card, or could it be mounted on the motherboard?

4. Now remove all the remaining cables, then remove the CD/DVD and hard drive.



This is an "IDE" ribbon cable connector for the CD/DVD drive.



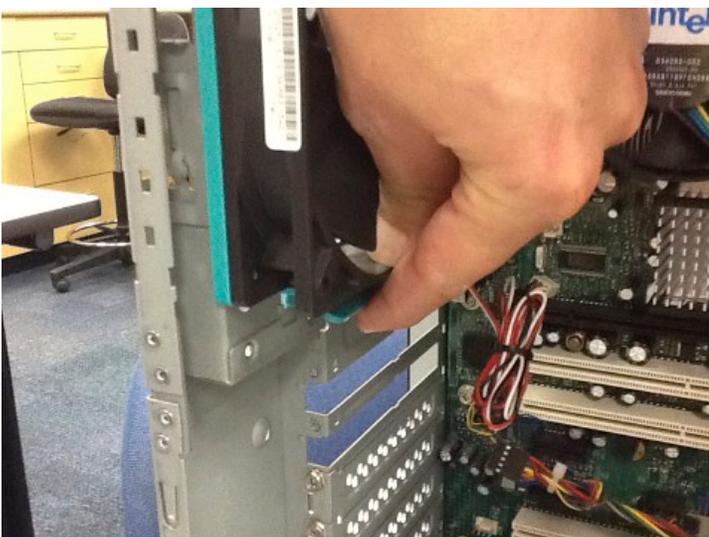
This is a "SATA" connector for the hard-drive. It's a newer type of connection than the older "IDE" connections. Look up both terms and write down the key differences:



Lay the hard drive upside-down carefully. Note the circuit card mounted on the hard drive. Why do you think it is there?



5. The fan has screws on the back side and is released with the aqua colored tab.



6. The memory (RAM) is mounted on the motherboard and is released by pressing firmly on the two white tabs on either side of each memory card. The card will pop out once the tabs are fully depressed.

RAM is particularly sensitive to ESD, so handle the cards very carefully by holding them by the edges (not metallic)



Put the memory right back in by pressing firmly into place. It's not worth having it lying around somewhere getting lost or damaged.

7. The motherboard is held to the chassis by eleven screws. Remove them all.



Gently hold the motherboard by the sides and remove it. Can you find the CPU?

Now – put it all back together. Good luck!

Conclusion and Results:

Your lab report will consist of two paragraphs, in the first paragraph:

- Briefly describe what you did in the lab.
- Discuss something new that you learned.

In the second paragraph, answer the questions:

- How could an adversary use this knowledge or these tools for malicious purposes?
- How could you use your new understanding to protect your systems and personnel from attack?